

## **Immunomodulatory Activity of Polysaccharide-Protein Complex Isolated from the Sclerotia of Polyporus Rhinocerus in Murine Macrophages**

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**Abstract :** Bioactive polysaccharides and polysaccharide-protein complex derived from mushrooms and fungi have a wide range of immunomodulatory activity with low side-effects and have therefore the potential to be developed as an adjuvant in cancer therapies. Mushrooms sclerotium is rich in polysaccharides and the polysaccharides isolated from the sclerotium of Polyporus rhinocerus have shown potent in vivo and in vitro immunomodulatory effects. Macrophages are considered to be an important component of the innate immune response against bacterial infection and cancer. To better understanding the immunomodulatory effects and its underlying mechanisms of sclerotial water-soluble polysaccharides extracted from P. rhinocerus on macrophages, the objectives of this study are to purify the water-soluble novel sclerotial polysaccharides and to characterize the structure and properties as well as to study the detailed molecular mechanisms of the in vitro immunomodulating effects in murine macrophages. The hot water-soluble fraction PRW from the sclerotium of P. rhinocerus was obtained using solvent extraction. PRW was further fractionated by membrane ultrafiltration to a give a fraction (PRW1) with molecular mass less than 50 kDa. PRW1 was characterized to be a polysaccharide-protein complex composed of 45.7% polysaccharide and 44.2% protein. The chemical structure of the carbohydrate moiety of PRW1 was elucidated by GC and FTIR to be mainly beta-D-glucan with trace amount of galactose and mannose. The immunomodulatory effects of PRW1 on murine RAW 264.7 macrophages were demonstrated in terms of the increase in nitric oxide production and cytokine production. Mechanistically, PRW1 initiates ERK phosphorylation to activate macrophages within 15 min and significantly improves the expression level of inducible NOS (iNOS) from 6 h after treatment. In summary, this study indicates that PRW1 is a potent immunomodulatory agent for macrophages and suggests that mushroom sclerotia from Polyporus rhinocerus requires for further investigation in cancer research.

**Keywords :** Polyporus rhinocerus, mushroom sclerotia, Polysaccharide-Protein Complex, macrophage activation

**Conference Title :** ICFSNH 2016 : International Conference on Food Science, Nutrition and Health

**Conference Location :** Amsterdam, Netherlands

**Conference Dates :** May 12-13, 2016